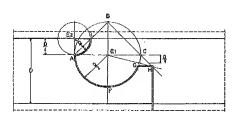
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## (19 CA) CANADIAN PATENT

- 64) SHAPE-LOCKING JOINT CONNECTOR FOR PANEL-SHAPED CONSTRUCTION ELEMENTS WITHOUT ANY SEPARATE CONNECTING PARTS
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No. OF CLAIMS



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Fig. 1

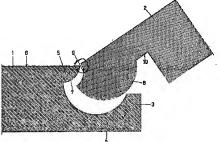
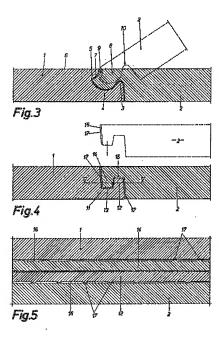
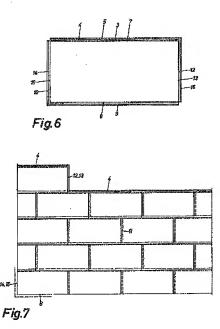


Fig.2

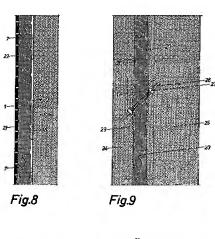


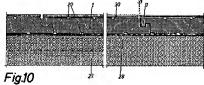


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THE EMBODINARYS OF THE INVENTOR IN WHICH AN RECLUSIVE PROPHETY OF PRIVILEGE IS CLAIMED AND HERITAGD AS FOLLOWS:

- A four-locking connocian for panel-shaped construction elements without separate connectors, characterized in that on one edge of the construction element there is a rounded channel that is open to the outer surface of said construction element making a stop strip on the side opposite the edge strip, and channel having a stop strip on the side opposite the edge strip, said stop strip being flush with the outer surface and protruding into the space formed by said channel, while the outer surface and protruding into the space formed by said channel, while the outer surface and protruding into the onestvuction element is of a shape that corresponds to this configuration to causer form-locking suggessmet with the edge.
- A form-looking connection according to Ulaim 1, characterised in that the radius of the channel is are-shaped in cross-section.
- a joint according to Claim 2, clarecterized in that the radius of the channel is approximately one-half the thickness of the construction clament.
- A joint according to Claim 1, characterized in that the stop strip
  is arc-shaped on its circumference in cross-section.
- A frint scoording to Claim 4, characterized in that the step strip
  is formed in cross-section as a quadrant, the radius of said quadrant being
  approximately one-quarter the thickness of the construction element,
- 6. A joint according to Claim 1, characterised in that the centre point of the channel and the point of intersection of the channel and the step strip lie in a plane that is parallel to the plane of the construction element.
- 7. å joint according to Claim 1, characterized in that the centre point of the stop storip lies at the point of intersection of the tangent to the channel that is perpendicular to the plane of the construction closest and the outer surface of the construction element.

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- A joint according to Claim 1, Characterized in that the height of the edge strip is approximately one-half to three-quarters the thickness of the comparaction element.
- A joint according to Disim I, characterised in that it is arranged on two apposite edges of a rectangular inswisting panel of formed synthetic rogin,
- An insulating panel according to Claim 9, Characterised in that 10. the remaining edges of the panel are provided with known joints, oriented towards opposite sides of the paul, said joints consisting of interlocking gruovus that are continuous along the whole of the side of the panel.
- An insulating panel according to Claim 10, therapterized in that the edges of the panel are provided on the front faces with boad-like thickened partious, arranged at intervals and causing perpendicular to the plane of the panel.















The invention relates to a shape-locking joint connector for panelformed construction elements, without any superste connecting parcs.

The simplest manner of joining construction elements together is by a butt joint. However, a butt joint can only withstund compression forces; it cannot withstand tensile forces nor lateral forces.

A simple or compound step joint can trunsmit compressive forces that act is a specific direction, but it cannot transmit tensite forces. Compressive and lateral forces can be absorbed, for example, by means of a Longue-and-grouve joint, but this joint cannot transmit tensile forces.

The so-called hooked step joint is also familiar in connection with insulating puncls made of founed synthetic-resis plastic; in these joints there are grouves accompanied by strips arranged along the edges of the punch that are to be joined. Blood they open on different sides of the panel and interlock with each other, they thereby preate a joint that can withstand both compressive and tensile Forces, However, lateral forces can be transmitted only to a limited extent in such a joint, and then only in one direction.

It is the object of the invention to groute an offective shapelocking conmoction for construction elements of all kinds that are, by preforence, penal formed, without the use of sublitional Pastenings, such a connection being capable of withsteading compressive, tensile and lateral forces in any direction.

According to the invention, there is provided a form-locking connoction for punci-shaped construction elements without separate connectors, characterized in that on one edge of the construction clowent there is a tounded channel that is open to the outer surface of said construction element. said channel being followed by an edge strip, said channel having a stop strip on the side opposite the edge strip, said stop strip being flush with the outer surface and protreding into the space formed by said change), while the corresponding edge of the adjacent construction element is of a shape that corresponds to this configuration to ensure form-locking engagement with the edge.

In cross-section, the channel is appropriately are-shaped, its

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codius being approximately equal to half the thickness of the construction element. In cross-section, the stop strip is also appropriately arc shaped. to cross-section, it can be found as a quadrant of a radius approximately equal to one quarter the thickness of the construction element,

The centre point of the chemos and the point of intersection of the channel with the step strip are best located in a place that is parallel to the plane of the construction element.

It is expedient that the centre point of the stop strip be located at the point of intersection of the tangent to the channel that is perpendicular to the viene of the construction element, with the top surface of the construction element.

The height of the edge sail is best selected so as to be approximately one-half to three-quarters the thickness of the construction element.

The problem moved is completely solved by the configuration of

the edges of the construction element proposed by the invention. The channel that is arranged on one edge of the construction element, and the edge strip, In conjunction with the appropriately-formed edge of the adjacent construction element, provide for a connection that can withstand tensile and compressive forces, while the stop rail, in conjunction with an appropriately-matching recess in the edge of the adjacent construction element, locks the joint seainst movement in a direction that was not possible using the familiar bookod step joint. The arc-shaped rounding of the channel satisfies the basic requirement that the second construction element; that is to be joined to the first construction closent, can be fitted by its edge into the channel of the first construction element, obliquely from whove, and when being aligned with the construction element that has already been installed, it locks practically nutematically.

Continuous surfaces of any size can be produced using the shapelocking joint according to the issention, without the use of any additional fascenings, such as unils, surpes, cleans, adhesives, etc., to connect tho individual construction elements. The joint according to the invention sisp ensures that the construction elements that have been installed alf lie in the

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some plane and no subsequent fewelling operations are required.

The use of the step joint schording to the importion is not confixed to one specific material. Melther does the fabrication of the undercut portions of the connection present may difficulties. In the case of wood or wood products, the portions of the grouve can be milled. In the case of fosmed synthetic resin plastics, from which the majority of insulating panels are wade, it is possible to provide the production machinery, e.g., the Form machines, with swing-away tool elements which are first of all swong back before the two-part would opens and releases the formed panel. Accordingly, the main area of application of the joint according to the invention to in formed-plastic insulating panels in which it is used on two opposite edges of the panel, while the remaining edges are preferably provided with familiar interlocking grooves that are oriented towards opposite sides of the panel and consist of edge strips that are followed by channels that are continuous over the whole length of the side,

Sesides this, the front surfaces of the edge strip can also be provided with protruding areas located at intervals along the said front sur-Paces, that extend perpendicular to the plane of the ponel.

Proferred areas of application for construction elements, especially panels or panel-like forms, that are provided with the joint according to the invention, are ceiling coverints; floor coverings, wall coverings, insulating layers in malls and roofs, etc., thus, in all areas where it is a matter of having continuous, level coverings or overlays.

The invention will now be described in greater detail, by way of example only, with reference to the accompanying drawings; in which:

Figure 1 is a cross-section through the joint according to the invention that iflustrates details of the design.

Figure 2 is a cross-section through the two portions of the joint during assembly.

Figure 3 is a cross-section through the joint according to the invention in two insuluting ponels.

> Pigure 4 is a cross-section through the booked step julne on the -3.























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odges that are perpendicular to those according to Figure 3.

Piguro 5 is a Tongitudhal section on the line V - V is Figure 4. Figure 6 is a plan view of an insulating passal with the joint according to the lavention.

Figure 7 is a part of a well covered by such insulating panels. Figure 8 is a cross-section through insulating panels applied to a verticul wall.

Figure 9 is a cross-section through a concrete wall having an insulated core consisting of such populs.

Figure 18 is a cross-soction and a longitudinal section through a flat roof having external insulation in the form of panels with edges formed according to the invention.

In the cross-section through a joint according to the laveation, Figure 2 shows two adjacont construction elements 1 and 2 that have suprepriatoly-configured edges. The edge configuration of the panel 1, on the left of the illustration, has an edge strip 3 that includes a arc shaped channel 4 to one side. On the side of the channel 4 opposite the edge strip 3, a stop strip 5 protrades into the space formed by the channel, and this stop strip is Flush with the top surface 6 of the panel 1, reaching with an arc-shaped curved portion 7 from the top surface 6 of the punel to the channel 4.

The right-hand panel 2 has an edge coaffguration that corresponds to the cage configuration of the panel I like a counter die matches a die. This edge configuration consists of a thickneed portion 8 that fits in the channel 4 and has at its outer edge a recess 9 that corresponds to the stop strip 5. This edge configuration fits and locks, by virtuo of its shape, into the edge configuration of panel I. the outer surface of the thickened portion B sliding along the arc-shaped curved portion 7 that corresponds to 1t, until the recess 9, which is also are-shaped, rosts against the correspondinglycurved stop strip 5 and the edge channel 10 covers the edge strip 3. Thus the joint is automatically locked.

Certain specific dimensional relationships have shown themselves to be particularly expedient for the configuration of the joint according to - 4 -

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the invention. These relationships are shown in Figure 1.

if a represents the thickness of the pasel, them the centre point H 1 for the pro-shaped channel is located at a distance of D/4 below the top edge of the channel. The radius of the are that contains the channel is 0/2. The centre point K 2 for the arc that is restained by the stop strip lies on the tangent to the circle forming the changel, which tengent originates at point A, and is perpendicular to the place of the panel, where the tameent intersects with the surface of the panol. The radius of the use is D/4.

The first coordinate for the outer point H of the edge strip that

forms the boundary of the channel is found by producing the side 8 - C of the triangle A, B, C that is drawn on the dismotor A - C of the change (-forming circle with radius D/2. The second coordinate for the paint H is found by producing a line from the contro B 1 of the sircle through point G to the extended line B - C. The print G is becated at the point of intersection of a line, drawn parallel to A - C, at a distance of D/8 bolow A - C, and the circumforcage of the circle drawn with contro E 1. According to the area of application and the loading that is to be applied to panels that wro provided with joints according to the invention, the thickness D of the panel can be increased in either direction. This increase in thickness is represented by the dotted lines in Figure 1. In the case of materials, such as formed synthethe resin plastics, that are less capable of hearing toads, the panel should be thickened by extending it upwards, whereas panels that are subjected grimartly to tension are best thickened by a downwards increase.

Several sections through insulating panels of fosmed synthetic rosin plastic are shown in Figures 4 - 5. These panels are provided with joints according to the invention. Pigore 5 corresponds approximately to Figure 1; in this case the joint is arranged on both long sides of insulating panels that measure 100 x 50 cms in most pases.

During laying, the lower portion 4 of the joint always faces in the direction of application. The upper partian 8 of the next panel can then be casily insorted whom slanted slightly, since displacement is possible on the curved surfaces. As soon as each newly-laid puncl to flush, it is automatical-















ly locked in position, whereupon the adjacent panel is stopped to the prescribof position both in the plane of the panel and perpendicular to this.

There is a hooked sten joint 11 on both marrow sides. This joint consists of a lower rail 12, the lower channel 14, the upper rail 14 and the upper channel 15. It is expedient that there be small bulges 17 on the outer odges 16. This will enduce that the parks of the joint are not in continuous contact; this can be advantageous, for example, for allowing water to except from the invected flat roof shown in Figure 10. The burges 17 also ensure that the parts of the point that furva been beter looked stick somewhat, and the parel I that has been inid is held in contition until such time as the next Tow of panels 2 with its joint that stabilises the perpendicular thrust, has been instalted.

The lower rail 12 and the upper rail 14 only touch the edges of the adjacent joint at the bulger 17 formed on the edges 16. Thus the joint can be fitted together without any special effort; neither is there any toget the danger that underlying issulating panels that have been layed in a bed of Fresh concrete will be disturbed when the real 14 of the new panel is inserted.

The insulating panels of fusied synthetic resin, for example, poly-

styrol, are produced in a standard shape, and have the joint and the configuration of the paget surfaces formed at this time. Insulating penels made in this way are of a procise size and perfectly summer, by which characteristic they differ fundamentally from so-called out panels. On the upper edge of the drawing at Pigure 6 there is the lower purtion 4 of the joint, and on the lower edge there is the matching upper portion 8. Parts 4 and 8 are open along their whole lengths in order that they can be positioned at may position over previously laid panels. Both sides of the panel I show, on the right, the lower rail 12 with the lower channel 15 and, on the left, the upper rail 14 with the unper channel 15. The edges 16 of the panel are provided with the bulges 17.

Pigner 7 is a partial view of a sall covered with panels according to the knyenting. The upper portions 8 of the lowest row of panels that rosts, for example, on a hase, are to be removed, as are the upper portions

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34 and 15 of the hooked joint 13 of all the punels on the surface of the eatl. As soon us the first row has been installed, a start can be made in installing the second and subsequent costs. The vertical joints II are to be staggered. The lower portions 4 always face in the direction of smellestion. The moner portion 8 that is inserted therein stabilises the transverse joints. In sold from to this, the people that are located below are entemptically pressed into alignment.

Figures 8, 9 and 10 show practical applications of the new panels,

The new panels I can be used to advantage for covering walls, for example, for single-layer external insulation. For this purpose, they are applied to the masonry 19 with adhesive plaster 18. In order to improve adhosion, there are graces 20 for the adhesive on the backs of the panels. those grappes turning in all directions. During manufacture, those pagets 1 are covered with small panels 21. It is expedient that the joints between these panels 71 extend somethat into the upper surface of the insulating page). As soon as the insulating penel that is covered in this way has been installed, the whole of the wall that has been covered in this way is pointed so that none of the individual panel joints can be seen. Bocause of the formation of the joints according to the invention, and especially because of the arrangement of the stop strip 5, it is guaranteed that att the insulating penels 1 that have been applied will be flush and form a continuous insulating tayor.

The example shown in Figure 9 is a porred concrete watt, that is sheathed and poured during construction, with on insularing core. After the walf sheathing, not shown in the drawing, has been erected, the insulating panels, previously joined together to form us insulating wat, are installed at the prescribed position in the shouthing. They can be additionally stabilized by switmbly-shaped metal strips 25. Further, it is expedient to produce the supporting connection between the 5 - 8 on thick outer layer to the interior supporting wall 25 through the metal strips 23. Anchor bolts 26 can be used for this purpose, these holts passing through the insulating core I and pressing the metal strips 23 to the insulating core 1 by weams of much 27. When it is poured in, the concrete for the outer layer 24 of the supporting wall 25

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corrounds the metal strips 25, thereby providing a permanent connection for the layers of concrete that are separated by the insulating core. For this purpose, the insulating panels I are spain provided with grouves 20 on both sides. Using the new panels, made-to-measure insulating mets can be prefabricuted without the use of special adhosives or the like. Imdeed, it is outficient to have a dry joint between the penels.

inverted fluts roofs are single-layer flot month to which are applied a roof scaler, and then a moisture-proof and ago-resistant insulating layer, which in turn has to be provided with a coating to protect it against ultra-violet radiatios. This protective layer, usually a layer of gravel or concrete slabs, holds the light insulating panels securely in position.

According to Figure 10, the sealing layer, for example, tur paper, plattle shoots or spalant, is applied to the supporting roof, for example, a reinforced concrete roof. The edges of this scaling layer are arranged at the edge of the roof in such a manner as to provide a rain-proof soul. The in-Sulating pausis, covered with a previously-amplied layer of covering panels 30 made, for example, of appeator comput, are then applied. Use of the loint according to the invention results in a continuous insulating layer, from which it is impossible to remove individual puncls. In this case too, the insulating pagets 1 have crise-crossed grooves 20 on their upper and lower surfaces. Rain that falls on the upper surface can, as is thown at 51, flow through the open sesses of the opening plate 30 into the open grooves, passing from there through the houted step joint 11, that is not completely closed, thus reaching the underside of the insulating pagel 1, from where it now off In the area of the lower prooves 20 over the coof sealer 20 to the causetwoughing, that is not shown to the drawles.

# ABSTRACT

A shape-locking joint connector for panel-formed construction elements that uses no separate connecting parts, is disclosed. The connector is characterized in that on one edge of the construction element there is a rounded channel that is open to the outer surface of the construction element, said channel being followed by an edge strip. On the side opposite the edge strip, the channel has a stop strip which is flush with the outer surface and protrudes into the space formed by said channel, while the corresponding edge of the adjacent construction element is of a shape that corresponds to this configuration to ensure form-locking engagement with the edge.